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REMARKS

Claims 1-9 and 12-20 are all of the claims presently pending in the application. Claims 5, 6 and 8 have been merely editorially amended in accordance with local practice and have not been substantively amended.

Entry of this Amendment is believed proper since no new issues are being presented to the Examiner which would require further consideration and/or search.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicant gratefully acknowledges the Examiner's indication that claims 7-9 and 13 are allowed and that claims 6, 18 and 19 would be allowable if written in independent form. However, Applicant respectfully submits that all of the claims are allowable.

Claims 5 and 6 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. Claims 1-2, 6, 14 and 20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by IBM Technical Disclosure Bulletin (TDB-ACC-NO: NN75101486, Vol. 18, Issue 5) (hereinafter "IBM"). Claims 5 and 15-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over IBM. Claims 4 and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over IBM in view of Fujitsu LTD (JP 53016396A) (hereinafter "Fujitsu"). Claims 3 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over IBM in view of Kawama et al. (U.S. Patent No. 5,665,607) (hereinafter "Kawama").

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined in claim 1) is directed to a method of producing a crystal growth substrate. The method includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate, growing a sapphire crystal on the sapphire growth surface of the seed substrate to thereby form a sapphire substrate and removing the seed substrate selectively from the sapphire substrate formed by the growing a sapphire crystal (e.g., see Application at page 3,

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line 17, through page 4, line 2).

The claimed invention (e.g., as defined in claim 20) is directed to a method of producing a semiconductor light-emitting element. The method includes growing a desired semiconductor layer as a crystal on a sapphire substrate grown on a seed substrate and removing the seed substrate (e.g., see Application at page 6, line 19 through page 7, line 6).

These features are important for improving the external quantum efficiency of a semiconductor light-emitting element, as well as light-condensing characteristics and light directivity (see Application at page 3, lines 9-15).

II. THE 35 USC §112, SECOND PARAGRAPH REJECTION

The Examiner has rejected claims 5 and 6 under 35 U.S.C. §112, second paragraph, as being indefinite. Specifically, the Examiner alleges that it is not clear what is meant by the term "second substrate" and it is not clear exactly where the cavities are formed.

Applicant has amended claims 5 and 6 to overcome the Examiner's rejection by replacing the phrase "second substrate" with the phrase "seed substrate". Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III. THE PRIOR ART REFERENCE

A. The IBM Reference

The Examiner alleges that IBM teaches the claimed invention of claims 1-2, 6, 14 and 20. Furthermore, the Examiner alleges that the claimed invention of claims 5 and 15-17 would have been obvious in view of IBM. Applicant submits, however, that IBM does not teach or suggest each and every feature of the claimed invention.

That is, IBM does not teach or suggest "*molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate*" as recited in claim 1.

The Examiner alleges that IBM teaches growing sapphire on silicon, wherein the silicon layer has cavities. The Examiner attempts to rely on Figures 2A-2B and the Abstract of IBM to support her allegations. However, Applicant submits that the Examiner is clearly incorrect.

That is, nowhere, in these figure nor this passage (nor anywhere else for that matter) does IBM teach or suggest a method of producing a crystal growth substrate that includes

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molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. Indeed, IBM merely teaches using a silicon wafer having an etching pit as a negative die for the production of a sapphire styli.

The claimed invention provides a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. The plurality of irregularities formed on the seed substrate allows for molding to be easily performed so that a large number of microlens-shaped convex portions are arranged in a rear surface of the sapphire substrate.

IBM merely discloses that SiO₂ is grown on both sides of a bilaterally polished, n-type, crystal oriented silicon wafer. The SiO₂ is subsequently removed on the bottom side by buffered hydrofluoric acid. The wafer is etched to form an etching pit (see IBM at Abstract). The etching pit is indicated by the lines (111) in Figure 2B. Figures 1 and 2B clearly show that there are no irregularities in the surface of the Si layer, the etching pit (i.e., the sapphire growth surface) or the final sapphire styli (see Figure 1). Therefore, IBM clearly does not teach or suggest molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate.

The Examiner alleges that the silicon layer of IBM has cavities, which are allegedly depicted in Figures 2A and 2B. Again, we would argue that IBM does not teach or suggest that the irregularities are formed in the seed substrate. Assuming, arguendo, that the trench portion of IBM is an "irregularity", the trench portion would merely teach a single cavity, and would not teach or suggest "cavities each having part of a substantially spherical shape during said molding a seed substrate" as recited in exemplary dependent claim 5.

However, it is still unclear as to which feature of IBM the Examiner is relying on as teaching "irregularities" and "cavities". Indeed, the Examiner merely directs the Applicant to Figures 2A and 2B of IBM, but does not indicate which features in those figures she is relying on.

Applicant points out that the Examiner's rejection fails to comply with 37 C.F.R. §1.104(c)(2) which requires that "the particular part relied on must be designated as nearly as practicable. The pertinence of each, reference, if not apparent, must be clearly explained and each rejected claim specified". In this case, the Examiner has failed to point out which features of the IBM reference that may have been relied upon. Applicant submits that it is unclear where IBM teaches or suggests "cavities" or "irregularities" in the substrate of the

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IBM device.

Therefore, if the Examiner wishes to persist with this rejection Applicant requests that the Examiner specifically point out where the claimed features are taught in the reference (i.e., rather than merely referring to a Figure in the reference).

Moreover, IBM does not teach or suggest "*growing a desired semiconductor layer as a crystal on a sapphire substrate grown on a seed substrate*" as recited in exemplary claim 20.

IBM merely teaches forming a sapphire styli. However, nowhere does IBM teach or suggest forming a semiconductor on the sapphire styli. Indeed, the Examiner does not even allege that IBM teaches or suggests this feature. That is, nowhere in her rejection of claim 20 (nor anywhere else in the Office Action for that matter) does the Examiner even mention this feature. In fact, in the Office Action dated October 13, 2004, the Examiner conceded that IBM did not teach or suggest this feature. The Examiner clearly stated that the "[p]rior art neither teach nor suggest growing semiconductor layer on the sapphire substrate grown on a seed substrate and removing seed substrate" (see Office Action dated October 13, 2004 page 3).

Therefore, if the Examiner wishes to persist with this rejection Applicant requests that the Examiner specifically point out where the claimed features are taught or suggested in the reference. Again, the Examiner has not even alleged that IBM teaches or suggests this feature, let alone specifically point which portions of IBM teach or suggest this claimed feature.

Therefore, Applicant submits that there are elements of the claimed invention that are neither taught nor suggested by IBM. Therefore, the Examiner is respectfully requested the reconsider and withdraw this rejection.

B. The Fujitsu Reference

The Examiner alleges that Fujitsu would have been combined with IBM to teach the claimed invention of claims 4 and 15. Applicant submits, however, that these references would not have been combined as alleged by the Examiner and that, even if combined, the combination of references would not teach or suggest each and every element of the claimed invention.

That is, Applicant submits that there is no motivation to combine the references as alleged by the Examiner. Indeed, the Examiner has not even provided a motivation for combining the references.

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Applicant points out to the Examiner that MPEP § 2142 states “[t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings” (emphasis in MPEP) and that “it is the duty of the examiner to explain why the combination of the teachings is proper”. The Examiner has not provided her reasoning for combining the references. Therefore, Applicant submits that Examiner has clearly not made a *prima facie* case of obviousness.

The Examiner still does not provide any reasoning or motivation for combining Fujitsu with IBM. That is, the Examiner merely states that Fujitsu teaches “heat treating the grown sapphire at a temperature 1270°C to form alpha sapphire (alumina) layer” (see Office Action dated April 4, 2005 at page 5) and that “[i]t is obvious to modify the Primary reference by IBM because Fujitsu teaches heat treating the sapphire to form alpha phase sapphire”. Again, the Examiner has not provided any motivation to modify IBM. The Examiner has merely stated what features Fujitsu allegedly teaches but does not provide any reasoning for why there is motivation to combine those features with IBM.

Furthermore, there does not appear to be a need in IBM to heat treat the sapphire to form alpha phase sapphire. Thus, as pointed out in MPEP 2143.01, the Examiner’s motivation is “improper”. “The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination” (emphasis added by Applicant). Therefore, Applicant submits that the Examiner has clearly not made a *prima facie* case of obviousness.

Moreover, neither Fujitsu, nor IBM, nor any combination thereof, teaches or suggests “molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate” as recited in claim 1.

The Examiner alleges that Fujitsu teaches a method of growing sapphire on a silicon substrate at a temperature of 600°C and heat treating the grown sapphire at a temperature of 1270°C to form an alpha sapphire substrate. The Examiner attempts to rely on the Abstract of Fujitsu to support her allegations. Applicant respectfully disagrees.

That is, nowhere in this passage does Fujitsu teach or suggest a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. Indeed, the

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Examiner does not even allege that Fujitsu teaches or suggests this feature. Therefore, Fujitsu does not make up for the deficiencies of IBM.

Moreover, neither IBM nor Fujitsu, nor any combination thereof, teaches or suggests “growing a desired semiconductor layer as a crystal on a sapphire substrate grown on a seed substrate” as recited in exemplary claim 20. Indeed, the Examiner does not even allege that Fujitsu teaches or suggests this feature. Therefore, Fujitsu does not make up for the deficiencies of IBM.

Therefore, Applicant submits that even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

C. The Kawama Reference

The Examiner alleges that Kawama would have been combined with IBM to teach the claimed invention of claims 3 and 12. Applicant submits, however, that these references would not have been combined as alleged by the Examiner and that, even if combined, the combination of references would not teach or suggest each and every element of the claimed invention.

That is, the Examiner’s motivation to modify IBM (“to remove silicon material from sapphire”) does not appear to be a problem in IBM that would require a solution. That is, IBM already provides a means for removing the silicon material from the sapphire. IBM teaches that the silicon is removed from the sapphire styli array by evaporation or by contact with a 900°C Cu plate.

Thus, as pointed out in MPEP 2143.01, the Examiner’s motivation is “improper”. “The mere fact that references can be combined or modified does not render the resultant combination obvious **unless the prior art also suggests the desirability of the combination**” (emphasis added by Applicant). Therefore, Applicant submits that the Examiner has clearly not made a prima facie case of obviousness.

Moreover, neither Kawama, nor IBM, nor any combination thereof, teaches or suggests “molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate” as recited in claim 1.

The Examiner alleges that Kawama teaches etching silicon to separate the silicon from sapphire using HF. The Examiner attempts to rely on Figure 13b and column 23, lines 27-40

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of Kawama to support her allegations. Applicant, however, respectfully disagrees

That is, nowhere in this passage or this figure (nor anywhere else for that matter) does Kawama teach or suggest a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. Indeed, the Examiner does not even allege that Kawama teaches or suggests this feature. Therefore, Kawama does not make up for the deficiencies of IBM.

Moreover, neither IBM nor Kawama, nor any combination thereof, teaches or suggests *"growing a desired semiconductor layer as a crystal on a sapphire substrate grown on a seed substrate"* as recited in exemplary claim 20. Indeed, the Examiner does not even allege that Kawama teaches or suggests this feature. Therefore, Kawama does not make up for the deficiencies of IBM.

Therefore, Applicant submits that even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested the reconsider and withdraw this rejection.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-9 and 12-20, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.


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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

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Respectfully Submitted,



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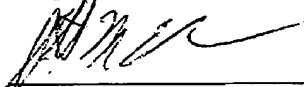
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I hereby certify that I am filing this paper via facsimile, to Group Art Unit 2812, at (703) 872-9306, on July 5, 2005.

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